Electronic Message Distribution

5 FIELD OF THE INVENTION

The present invention relates to electronic message
distribution. The invention relates particularly to the
distribution of electronic messages which may fall within
10 more than one different message classes or categories.

BACKGROUND TO THE INVENTION

Many organisations are now equipped to receive messages,
15 including orders and enquiries, by electronic means.
Typically, such electronic messages take the form of text-
based messages, for example e-mails, delivered by a global
computer network, for example the Internet, or by a
telecommunications network, for example a mobile telephone
20 network. Each message must be processed and dealt with
appropriately i.e. according to the nature of the message.
In many cases, the volume of received electronic messages
is relatively high and it is considered inefficient to
process each message manually.
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For this reason, it is known for electronic message
processing systems, typically in the form of a computer
system, to employ a text analyzer, such as IBM's Mail
Analyzer, to analyse the content of electronic messages in
30 order to classify, or categorize, each message according
to its content. Once a message has been categorized, the
processing system sends it on to a human agent who has the
skills necessary to deal with messages falling within the

relevant category(s). Alternatively, the computer system itself may be able to deal with messages falling within certain category(s).

5   Typically, a text analyzer examines the text of each message in turn in search of one or more alphanumeric text string, for example a word or sequence of words, which may be used to identify the purpose or nature of the message under examination. Normally the text analyzer operates in

10   association with a rule engine to apply a set of rules to the message in order to determine how to categorize the current message.

By way of simplistic example, a banking organisation may

15   have a message processing system arranged to receive electronic messages in three different categories, namely: balance enquiry; request for funds transfer; and interest rate enquiry. In order to categorize each received message, a text analyzer in association with a rule engine

20   applies a set of four rules to each message in turn. The first rule stipulates that if the text string "balance" appears in the message, then the message falls in the balance enquiry category. The second rule stipulates that if the text strings "funds" and "transfer" appear in the

25   message, then the message falls in the funds transfer category. The third rule stipulates that if the message contains the text string "interest rate", then the message should be categorized as an interest rate enquiry. The fourth rule stipulates that if none of the previous rules

30   are satisfied, then the message is deemed unclassified.

Clearly, a message may fall within more than one category.

For this reason, some conventional text and analyzers, including the IBM mail analyzer are capable of generating a set of more than one categories in which a given message is deemed to fall. Further, such text analyzers normally

5   associate with each category in the set an indication of the level of confidence with which the text analyzer has determined that the message falls within that category. Typically, the confidence level is expressed as a percentage.

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Once categorization is complete, the message has to be distributed to a human agent, or a computer (automated) agent, that is capable of dealing with messages falling within the relevant category or categories. There is a

15   problem, however, in that an agent may not have the capability to deal with all of the categories into which a given message falls. This is particularly true for large organisations which may receive messages falling in one or more of tens or even hundreds of categories, and where

20   each agent employed by the organisation is only trained to deal with a subset of those categories.

Conventionally, an e-mail processing system includes a distributor which is arranged to determine which category

25   has been assigned to a given message with the highest confidence level. The distributor then selects an agent that is capable of dealing with said category and forwards the message on to him (or it).

30   Upon receipt of the message, the agent duly deals with those aspects of the message that he can. If a message includes further aspects which fall within a category or categories that the agent cannot deal with, the onus is on

the agent to recognise this and to forward the message, together with the part-response that the agent was able to prepare, to another agent who does have the capability to deal with one or more of the outstanding categories.

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This is problematic since the agent may not recognise that there are other aspects of the message which require attention or may simply fail to forward the message on to another agent. This can result in a response being

10 returned to the customer (from which the message emanated) which only partly deals with the various orders or requests made in the message. This can be frustrating to the customer and damaging to the organisation as it may result in loss of business.

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SUMMARY OF THE INVENTION

In accordance with a first aspect of the present invention there is provided an electronic message distributing

20 apparatus for distributing electronic messages from a database to one or more agents, the database storing, in respect of each electronic message to be distributed, a set of one or more message classes into which the respective electronic message is deemed to belong, the

25 distributing apparatus comprising: means for determining, from said database, at least one message class in which an electronic message is deemed to belong; means for selecting, from a directory of one or more agents, an agent that has a capability to process electronic messages

30 that belong to said at least one message class; means for causing said electronic message to be rendered to said selected agent for processing thereby; and means for receiving from said selected agent a signal indicating

that said electronic message is processed; wherein, upon receipt of said signal, the distributing apparatus is arranged to determine, from said database, if said set includes one or more message classes in respect of which

5   said electronic message is not processed and, in response to determining that said electronic message has not been processed in respect one or more message classes in said set, is arranged to select a further agent to which to cause said electronic message to be rendered, which

10   further agent has a capability to process messages which belong to one or more of said unprocessed message classes.

Thus, the distributing apparatus of the present invention ensures that a given electronic message which falls within

15   multiple message classes is dealt with, or processed, in respect of all of said classes for which there is a capable agent. The distributing apparatus distributes a message to a plurality of agents if necessary until it determines that all aspects of the message which can be

20   dealt with, are dealt with. The onus on the agent to forward the message to other agents is removed. Hence, the likelihood that an inadequate reply message will be sent to a customer is greatly reduced.

25   In a preferred embodiment of the invention, each message class comprises a respective message group, each message group comprising one or more message categories. It is preferred to define one or more basic message categories into groups as this simplifies the distribution process.

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More preferably, it is assumed that when a message is sent to a particular agent in respect of a particular message class, or group, that the agent also deals with any other

aspects of the message which fall into classes or groups which the agent is capable of dealing with.

A second aspect of the invention provides an electronic
5   message processing system for distributing electronic messages amongst a plurality of agents, the system comprising:

a database arranged to store, in respect of each
10   electronic message to be distributed, a set of one or more message classes into which the respective electronic message is deemed to belong; and

a directory of one or more agents, said directory
15   including, in respect of each agent, a set of one or more message classes in respect of which the respective agent has a capability of dealing with electronic messages;

a distributing apparatus arranged to distribute electronic
20   messages to one or more of said agents, the distributing apparatus comprising:

        means for determining, from said database, at least one message class in which an electronic message is
25   deemed to belong;

        means for selecting, from said directory, an agent that has a capability to process electronic messages that belong to said at least one message class;
30

        means for causing said electronic message to be rendered to said selected agent for processing thereby; and

means for receiving from said selected agent a signal
indicating that said electronic message is processed;

5   wherein, upon receipt of said signal, the distributing
apparatus is arranged to determine, from said database, if
said set includes one or more message classes in respect
of which said electronic message is not processed and, in
response to determining that said electronic message has
10   not been processed in respect one or more message classes
in said set, is arranged to select a further agent to
which to cause said electronic message to be rendered,
which further agent has a capability to process messages
which belong to one or more of said unprocessed message
15   classes.

In a preferred embodiment, the database includes a first
set of data records each data record including means for
identifying the respective message to which it relates and
20   means for identifying a respective message class in which
said respective message is deemed to belong. The first
set of data records, which hereinafter is referred to as a
workflow table, serves as a list of all electronic
messages which have been received by the electronic
25   message system and which have undergone classification.
Preferably, each data record includes a status identifier
for indicating whether or not the electronic message to
which said data record relates has been processed in
respect of the message classification noted in the data
30   record.

Preferably still, all data records which relate to the
same electronic message, are prioritised with respect to

one another. Further preferably, the prioritisation is determined on the basis of the level of confidence with which the electronic message is classified into the respective message classes.

Preferably, the system includes a second set of data records, each data record in the second set also including means for identifying the respective message to which it relates and means for identifying a respective message class to which said respective message is deemed to belong. The second set of data records, hereinafter referred to as the distributor control table, serves as a list of electronic messages or part-messages, which are awaiting distribution by the distribution apparatus.

A third aspect of the invention provides a method of processing electronic messages in the electronic message processing system of the second aspect of the invention.

A fourth aspect of the invention provides a computer program product comprising computer program code stored on a computer usable storage medium for performing the method of the third aspect of the invention.

Other aspects of the present invention will become apparent to those ordinarily skilled in the art upon review of the following description of a specific embodiment of the invention and with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

5 An embodiment of the invention is now described by way of example and with reference to the accompanying drawings in which:

Figure 1 is a schematic view of a communications network
10 including a electronic message processing system;

Figure 2 is a more detailed schematic view of the electronic message processing system of Figure 1;

15 **Figure 3** is a schematic representation of data tables, arranged in accordance with the present invention, held within a database of the electronic message processing system of Figure 1;

20 **Figure 4** is a flow chart illustrating the operation of a classifier, in accordance with the present invention, included in the system of Figure 1;

Figure 5 is a flowchart illustrating the operation of a
25 distributor, in accordance with the present invention, included in the system of Figure 1;

Figure 6 is a continuation of the flowchart of Figure 5; and

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Figure 7 is a schematic representation of electronic message categories and groups arranged for use with the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

With reference to Figure 1 of the drawings, there is
shown, generally indicated at 10, a communications network
for the transmission of electronic messages 12. The
network 10 includes a global computer network 14, such as
the Internet, and a mobile telephone network 16 but, in
general, may include any computer network and/or
telecommunications network, including WAN, LAN or MAN
networks. The electronic messages 12 typically take the
form of, for example, e-mails, Web-page forms, SMS (Short
Message Service) text messages, as commonly used by mobile
telephones, or the like. It will be understood that the
present invention is not limited for use with any
particular such type or types of electronic messages.

The electronic messages 12 are transmitted across the
communications network 10 in conventional manner using,
for example, a mail server 20, Web server 22, servlet 24
and/or WAP (Wireless Application Protocol) gateway 26, as
appropriate, and using conventional transmission protocols
such as, WAP, HTTP (Hyper Text Transfer Protocol), SMTP
(Simple Mail Transfer Protocol), POP (Post Office
Protocol), or other suitable protocol. It will be
understood that the invention is not limited to use with
any particular transmission means or protocols.

The electronic messages 12 are received by a message
processing system 18 which may reside, for example, on an
organization's computer system (not shown) or an ASP's
computer system (not shown). The message processing
system 18 includes means for receiving electronic messages

in conventional manner which, in the example of Figure 1, includes an e-mail receiving module 28, an SMS receiving module 30 and a database 32 for storing received messages 12.

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In the example illustrated in Figure 1, the e-mail receiver 28 is arranged to receive e-mails in two ways. The first is directly from an ISP (Internet Service Provider) using SMTP, the second is via the mail server 20

10 using POP3. The e-mail receiver 28 is further arranged to receive Web-page form messages through the web server 22. Web-page form messages may be considered as structured e-mails which call the servlet 24 in the web server 22 which in turn converts the Web-page form content into an e-mail

15 which is subsequently sent to the e-mail receiver 28 using SMTP.

Web-page forms from the mobile network 16 are transmitted using a WAP protocol stack to the WAP gateway 26. The WAP

20 gateway 26 converts the Web-page form into an HTTP request, which is then processed by the web server 22 and servlet 24 as described above. SMS messaging from the mobile network 16 is conveniently transmitted using WAP to the SMS receiver 30.

25

Thus, the e-mail receiver 28 and the SMS receiver 30 are arranged in conventional manner to support the appropriate transmission protocols which, in the example of Figure 1, are SMTP and POP3 for the e-mail receiver 28, and WAP

30 (SMPP) for the SMS receiver.

The communications network 10 of Figure 1 is given by way
of example only to provide a typical context for the
invention and is not limiting to the invention.

5   Referring now to Figure 2, the message processing system
18 is shown in more detail. Electronic messages 12
received by the e-mail receiver 28 and SMS receiver 30 are
stored in database 32. A classification module 34, or
classifier, retrieves each message 12 from the database 32
10   in turn. The primary function of the classifier 34 is to
classify, or categorize, each message 12 into one or more
categories depending on the content of the message 12. To
this end, the classifier 34 is associated with, or
includes, a text analyzer 36, for example the IBM Mail
15   Analyzer and is further associated with, or includes, a
rule engine.

Once classified (or categorized), each message is returned
to the database 32 by the classifier 34 together with the
20   determined classification information and, preferably,
with information as to where the message should be routed
in view of its classification. For example, messages 12
falling within certain categories may require to be dealt
with by a human agent (not shown) with particular skills,
25   while messages 12 falling within other categories may be
dealt with automatically by a virtual agent 38.

A distributor module 40, or distributor, retrieves the
categorized messages and distributes them either to the
30   virtual agent 38 or a mail client 42, according to the
respective categorization and/or routing information. The
virtual agent 38 includes one or more software routines
which automatically generate an appropriate response to a

message 12 according to its categorization information.
The mail client 42 provides the message 12 to a human
operator, or agent, who then prepares an appropriate
response. Once a final response is prepared, the

5   distributor 40 marks the response as complete and causes
it to be stored in the database 32. Figure 2 only shows
one mail client 42 and one virtual agent 38 although in
practice there may be a plurality of each.

10 A composing module 44, or composer, retrieves responses
from the database 32 that are marked as complete and
composes a respective response message (not shown) for
reply to the originator (not shown) of the respective
received message 12. The composer 44 typically fulfils

15 any attachment requirements as well as adding the
appropriate Internet, or other, protocol information.
Each composed response message is then returned to the
database 32.

20 An e-mail dispatch module 46, or dispatcher, retrieves
from the database 32 the composed response messages which
are destined to be transmitted by e-mail and conveniently
dispatches them to an ISP (not shown) using SMTP. An SMS
dispatch module 48, or dispatcher, retrieves from the

25 database 32 the composed response messages which are
destined to be transmitted as SMS messages and dispatches
them to the mobile network 16 using SMPP protocol.

Conveniently, the modules of Figure 2 take the form of

30 CORBA (Common Object Request Broker Architecture) modules,
or servers written, for example, in the Java programming
language. Each module may reside on a single computer or
may be distributed across a computer system, as is

convenient. The e-mail receiver 28, SMS receiver 30, virtual agent 38, mail client 42, composer 44, e-mail dispatcher 46 and SMS dispatcher 48 are generally conventional in configuration and operation and are not

5 limiting to the present invention.

The text analyzer 36 is of the type which is capable of generating multiple categories for a given message. IBM'S mail analyzer is an example of such a text analyzer. One

10 aspect of the present invention is concerned with the arrangement and interaction of the classifier 34 and the distributor 40 for dealing with messages that fall within more than one category, as is now described in more detail.

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When an electronic message is processed by the text analyzer 36, the text analyzer 36 applies, in conventional manner, a set of rules to the content of the electronic message in order to determine the nature of the message.

20 In this way, the text analyzer 36 is able to classify, or categorise, the electronic message according to its content. Some messages may include more than one type of question or request and may therefore fall into more than one different class or category. For example, a customer

25 (not shown) of a banking organization may send in an e-mail message which comprises both a balance enquiry and a request for a funds transfer, each of which may be deemed to fall in a respective different category. The text analyzer 36 is therefore arranged to generate one or

30 more categories for each message that it processes, depending on the content of each message. The text analyzer 36 is further arranged to assign to each category that it generates, an indication of the level of

confidence it has that the categorisation is correct. The confidence level is typically expressed as a percentage.

With reference now to Figure 4, the classifier 34 is arranged to receive, for each electronic message, the or each category generated by the text analyzer 36 (module 401). At module 402, the classifier 34 arranges the or each category generated by the text analyzer 36 in order of confidence level. Table 1 illustrates an example where for a given electronic message (not shown), the text analyzer 36 generates a set of five categories, namely categories 1, 4, 5, 6, 8, in which it deems that the message belongs. Each category is associated with a respective confidence level expressed as a percentage.

CATEGORY	CONFIDENCE LEVEL	GROUP
6	98%	A
4	87%	C
1	86%	B
5	73%	C
8	64%	A

Table 1

ORDER	CATEGORY	GROUP
1	6	A
2	8	A
3	4	C
4	5	C
5	1	B

Table 2

In the preferred embodiment, the categories are further
arranged in groups and a group may embrace more than one
category. An example of this arrangement is given in
Figure 7 in which categories 6 and 8 are defined as

5   belonging to group A, categories 1 and 3 are defined as
belonging to group B and so on. Figure 7 is a simplistic
example in which there are only 8 categories and 4 groups
in total. In practice there may be, for example, hundreds
of categories distributed amongst tens of groups. While

10 the arrangement of categories into groups is not
essential, it is preferred since it simplifies the routing
of messages to agents particularly in cases where there
are a relatively large number of categories.

15 In Table 1, the categories are arranged in decreasing
order of confidence level and each category is further
associated with its respective group which, in the present
case, is either A, B or C. Table 1 is the result of the
classifier's activity under module 402.

20

At module 403, the classifier 34 re-orders the generated
categories according to both group and confidence level.
This is illustrated in Table 2 where category 6, being the
category having the highest confidence level, is placed at

25 the top of the table. Category 8 is placed next in Table
2 as it is also in group A but has a lower confidence
level than category 6. The third entry in Table 2 is
category 4 which has the next highest confidence level
after category 6 but is in group C rather than group A.

30 Category 5 is positioned next in Table 2 as it belongs to
the same group as category 4 but has a lower confidence
level and, finally, category B takes up last position in
the table.   When the categories are so ordered, they are

each assigned a respective order number or sequence
number. Thus, a given electronic message is associated
with a set of one or more categories which are ordered in
a sequence according to the level of confidence with which
5   each category has been assigned and, preferably, also
according to the group into which each category falls,
each category in the sequence having an order number or
sequence number which identifies its position in the
sequence.

10

It will be understood that there may be any number of
different categories and/or groups. The illustrations
given in Table 1 and 2 and Figure 7 show only a simplistic
example where there are eight categories and four groups.

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With reference now to Figure 3, the database 32 includes a
first set of data records, hereinafter referred to as the
workflow table 302, each data record, or entry 303,
including a message identification element (in the "ID"
20   column of the workflow table 302), a group identifier (in
the "GROUP" column in workflow Table 302), one or more
category identifiers (in the "CAT" column in table 302) a
sequence number identifier (in the "ORDER" column in
workflow table 302) and a status indicator (in the
25   "STATUS" column in workflow table 302).

It will be understood that the workflow table entries 303
need not necessarily include both a group identifier and a
category identifier. In general, each workflow table
30   entry should include a message class, or category,
identifier or other means suitable for determining to
which agent the corresponding message should be routed, or
distributed. Thus, the database 32 stores, in respect of

each electronic message to be distributed, a set of one or more message classes into which the respective electronic message is deemed to belong. The arrangement of Figure 3 (i.e. the inclusion of both group and category

5   identifiers) is preferred. As will be understood from the following description, the group identifier serves as a means for determining to which agent the corresponding message should be distributed, or routed, while the, or each, category identifier determines how the agent should

10   respond to the message.

Referring again to Figure 4, at module 404, the classifier 34 creates an entry 303 to the workflow table 302 for each group generated by the text analyzer 36 for a given

15   message. For example, the message for which Table 2 is generated is designated with the message identifier *message1*. The classifier 34 thus generates three workflow table entries 303, each including the message identifier *message1*, a respective group identifier, one or more

20   respective category identifiers, a respective sequence number and a respective status identifier. When the workflow table entries 303 are first created by the classifier 34, they are each given a status identifier which indicates that the entry 303 has not yet been

25   processed by the distributor 40. In the present example the status identifier "U" is used to indicate an unprocessed workflow table entry 303, while the status identifier "P" is used to indicate that the workflow table entry 303 has been processed by the distributor 40.

30

The classifier 34 creates one or more workflow table entries 303 for each message that it receives and processes (classifies). In Figure 3, the workflow table

302 contains entries 303 for a plurality of messages,
message1 to *messageN*. In Figure 3, the entries 303 are
shown to be ordered according to message identifier, but
this need not necessarily be the case.

5

The database 32 further includes a second set of data
records, hereinafter referred to as the distributor
control table 304. The distributor control table 304
comprises a plurality of data records, or entries 305,

10   each relating to a message, or part-message, which
requires distribution to an agent by the distributor 40.
In the present example, the entries 305 are arranged in
queue order i.e. the order in which they are to be
processed by the distributor 40. Each distributor control

15   table entry 305 includes a queue number (which may
conveniently be allocated on a first-come-first-served
basis), a message identifier (ID) and a class identifier.
It will be understood that order in which the entries 505
in the distributor control table 304 are processed, or

20   distributed, by the distributor 40 need not necessarily be
on a first-come-first-served basis and will depend on the
distribution policy being implemented by the distributor
(for example some groups may be given priority over
others). The distributor control table 304 therefore

25   represents a list, conveniently in queue order, of
messages or part-messages which are to be processed, i.e.
distributed, by the distributor 40. Each entry 505
further includes a status indicator for indicating whether
the entry 505 is unprocessed (U), processed (P) or in

30   progress (I).

Referring again to Figure 4, at module 405, the classifier
34 creates a distributor control table entry 305 for each

message that it classifies. In the preferred embodiment, the classifier 34 creates only a single distributor control table entry 305 - corresponding to the group which it has placed first in the sequence of categories - for

5   each message. Thus, in the example of Table 2, the classifier 34 creates a single distributor control table entry 305 corresponding to group A. The control table entry 305 comprises the message identifier *message1,* a group identifier for group A and two category identifiers,

10   one for category 6 and one for category 8. Thus, the respective sequence numbers or order numbers serve as a priority identifier as they indicate the relative priority of table entries 303 which relate to a given message.

15   The database 32 further includes a directory 306 of one or more agents that are available for selection by the distributor 40 and to which the distributor 40 may distribute or transmit a given electronic message for processing. The agent directory 306 includes a data

20   record, or entry 307, for each agent, each entry 307 including an agent identifier (Agent ID), an indication of the capability of the agent which, in the preferred embodiment, ·comprises identification of the group(s) that the agent can deal with, and an indication of whether or

25   not the agent is currently available to the distributor 40. This is illustrated in Figure 7, where Agent 1 (A1) can deal with groups A, B and D, Agent 2 (A2) can deal with group D only, and so on.

30   Referring now to Figures 5 and 6, the operation of the distributor 40 is now described. At module 501, the distributor 40 retrieves the distributor control table

entry 305 which is to be distributed next which, in the present example, is the one which is top of the queue.

At module 502, the distributor 40 marks the retrieved
5   distributor control table entry 505 as being in progress. This is achieved by setting the respective status identifier to "I".

At module 503, the distributor 40 refers to the agent
10   directory 306 and selects an agent that has the capability to process the group which is stipulated in the retrieved distributor control table entry 305, and which is currently available i.e. is not otherwise engaged, or absent.
15

The distributor 40 also determines from the agent directory 306 which other (if any) groups the selected agent can deal with. Then, at module 504, the distributor refers to the workflow table 302 to determine whether or
20   not there are any further workflow table entries 303 for the current message being processed i.e. the message which corresponds to the retrieved distributor control table entry. In particular, the distributor 40 determines if there are any further workflow table entries 303 for said
25   message which fall in a group that the selected agent can deal with.

By way of example, and with reference to Figure 3, the distributor 40 retrieves the first (Queue No.1)
30   distributor control table entry 305 from the distributor control table 304. The distributor 40 is able to determine from the retrieved distributor control table entry 305 that the message to which the control table

entry relates is *message1* and that *message1* contains at least one query/request falling into group A. The distributor 40 then refers to the agent directory 306 to select an available agent who is capable of dealing with

5 messages falling within group A. From the agent directory 306, the distributor 40 determines that *Agent1* is capable of dealing with group A but that *Agent1* is not currently available. The next available agent who is able to deal with group A is *Agent3*. The distributor 40 then selects

10 *Agent3* to deal with *message1*. Before assigning *message1* to *Agent3*, the distributor 40 refers to the workflow table 302 to determine if there are any further workflow table entries 303 for *message1* which *Agent3* is also capable of dealing with. In the present example, the workflow table

15 302 includes one further entry 308 for *message1*, in which entry 308 *message1* is classified in group C. The distributor 40 knows from the agent directory 306 that *Agent3* is also capable of dealing with group C.

20 At module 505, the distributor 40 communicates the message corresponding to the retrieved distributor control Table entry 305 (in the present example *message1*) to the selected agent (in the present example Agent3), noting which group(s) the selected agent is able to process.

25

Conveniently, to communicate the message to the agent, the distributor 40 communicates to the agent's mail client 42 the message identifier and a list of the or each category that the agent is expected to deal with. The mail client

30 42 is then able to retrieve the message from the database 32 for rendering to the agent. In the example of *message1*, the distributor 40 communicates to the mail

client 42 that the agent is to deal with *message1* in categories 4, 5, 6 and 8.

Advantageously, the mail client 42 is also provided with a respective set of one or more standard responses, or replies, for each category. These standard responses are conveniently pre-prepared by the organization operating the message processing system 10 and stored locally to the mail clients 42.

Thus, when the agent's mail client 42 receives the category information from the distributor 40, it generates a suggested reply to the customer containing all of the standard responses which correspond to the relevant category(s). The mail client 42 then renders the message to the agent with its suggested response. The agent can then review the message and amend the suggested response as appropriate. It can thus be seen that the group information in the workflow table 302 and distributor control table 304 determine how a message (or part-message) is routed or distributed, while the category information determines what response is made by the agent.

Conveniently, the mail client 42 at which the agent operates is arranged to allow the agent to signal to the distributor whether or not a message is processed, unprocessed and/or dismissed.

When the selected agent has finished processing the message that has been distributed to him, the agent signals to the distributor 40 that he has finished with the message. The mail client 42 at which the selected

agent operates, is arranged then to cause the agent's response to be returned to the database 32.

At module 506, the distributor 40 checks whether or not it has received a signal from the selected agent indicating that the message has been processed. If no such signal is received by the distributor 40, or if the selected agent sends an alternative signal indicating that the message has not been processed, then the distributor proceeds to module 507 in order to establish whether or not the message has been dismissed by the selected agent.

If, at module 507, the distributor 40 determines that the message has not been processed by the selected agent, then the distributor 40 returns to module 503 in order to select an alternative agent to send the message. If, at module 507, the distributor 40 determines that the message has been dismissed by the selected agent, then the distributor 40 refers again to the workflow table 302 and removes all of the workflow table entries 303 which relate to the dismissed message (module 508). At module 509, the distributor 40 marks the distributor control table entry as completed, or processed.

If, at module 506, the distributor 40 determines that the selected agent has processed the message, then the distributor 40 proceeds to module 601 (Figure 6).

At module 601, the distributor 40 refers to the workflow table 302 and updates the respective status indicator of each entry 303 which relates both to the message which has just been processed by the selected agent and to the, or each, group which said selected agent is capable of

processing. It does this by compairing the entries in the agent directory 306 with the group identifiers in the workflow table 302. In the example of Figure 3, the distributor 40 updates the status identifiers of the

5 workflow table entries 303 for *message1* in group A and in group C. This is shown in Figure 3 by means of the letter 'P' in the status column, rather than the letter 'U'.

At module 602 the distributor 40 marks the distributor

10 control table entry 505 as complete, or processed (P).

At module 603 the distributor 40 checks the workflow table 302 for further entries 303 which relate to the same message that has just been processed by the selected agent

15 but for which the respective status indicator shows that that particular entry 303 is unprocessed. In the example of Figure 3, the workflow table 302 includes a further entry for *message1* in group B which has the letter 'U' in the status column indicating that it is unprocessed.

20

If at module 604, the distributor 40 determines that further unprocessed workflow table entries 303 do exist for said message, then the distributor 40 proceeds to module 605. At module 605 the distributor 40 determines

25 which of the further unprocessed workflow table entries 303 has been ordered as the highest in priority i.e. which has the lowest sequence number or order number. In the example of Figure 3, the workflow Table entry 303 for *message1* in group B is the only further entry 303 for

30 *message1* and so automatically enjoys highest priority. However, should there be a further entry 303 for *message1* in, say, group D which were assigned order number 4, then the distributor to 40 would select the entry 303 in group

B in preference over said hypothetical group D entry since the group B entry has a lower order number i.e. 3.

At module 606, the distributor 40 creates a new
5   distributor control table entry 305 for said next, or highest priority, unprocessed workflow entry 303.   In the example of Figure 3, the distributor 40 creates a new distributor control table entry (not shown) for *message1* in group B.   In the present example the distributor 40
10   places said new distributor control table entry in queue order i.e. in the case where there are currently N entries already in the distributor control table 304, said new distributor control table entry is placed at queue number N+1.
15

After module 606, control returns to module 501 (Figure 5) whereupon the distributor 40 retrieves the next entry from the distributor control table 304.   In the present example, the next distributor control table entry 305 is
20   at number 2 in the queue and relates to *message2* in group B.   Modules 502 to 606 are repeated in respect of the newly retrieved distributor control table entry 305.

In this way, the distributor 40 makes its way through the
25   distributor control table entries to 305 in queue order (or according to whatever other distribution policy is being implemented).   In the present example, the distributor 40 will eventually encounter said new distributor control table entry at queue position N+1 in
30   the distributor control Table 304.   Thus, the distributor 40 once more attends to the processing of *message1*, although this time to process *message1* in respect of those group(s) which were not dealt with by the previously

selected agent. Thus, the distributor 40 causes the
message to be rendered to a further agent, which agent has
the ability to process messages which belong to one or
more of said unprocessed message groups. The process
5   continues until the message has been dealt with in respect
of all message groups for which there is a capable agent.

In the present example, only those aspects of *message1*
which relate to group B are outstanding. Modules 502 to
10 602 are repeated for the respective distributor control
table entry and, conveniently, *Agent4* is selected on this
occasion to deal with *message1* as *Agent4* has the
capability to deal with group B. When module 604 is
reached, the distributor 40 determines on this occasion
15 that there are no further workflow table entries for
message1. The distributor 40 then proceeds to Module 607
in the assumption that the processing of *message1* is
complete. At Module 607, the distributor causes *message1*,
together with the response(s) prepared by *Agent3* and
20 *Agent4*, to be sent to the customer (not shown) from which
message1 emanated. This is achieved in conventional
manner via the composer 44 and, say, the e-mail dispatcher
46.

25 After module 607, the distributor 40 returns to module 501
to retrieve the next entry from the distributor control
table 304.

The invention is described above in the context of a
30 simple banking organization. It will be appreciated,
however, that the invention is equally suitable for
application other fields.

The invention is not limited to the embodiments described
herein which may be modified or varied without departing
from the scope of the invention.